Supermicro's Extreme Energy-Efficient Compute Cluster powered by Submer

Unlocking the value of free-cooling

In the highly competitive general compute and cloud markets, innovation that enhances cost-efficiency at scale is essential to support customers in meeting the performance, scalability, and operational requirements of their workloads.

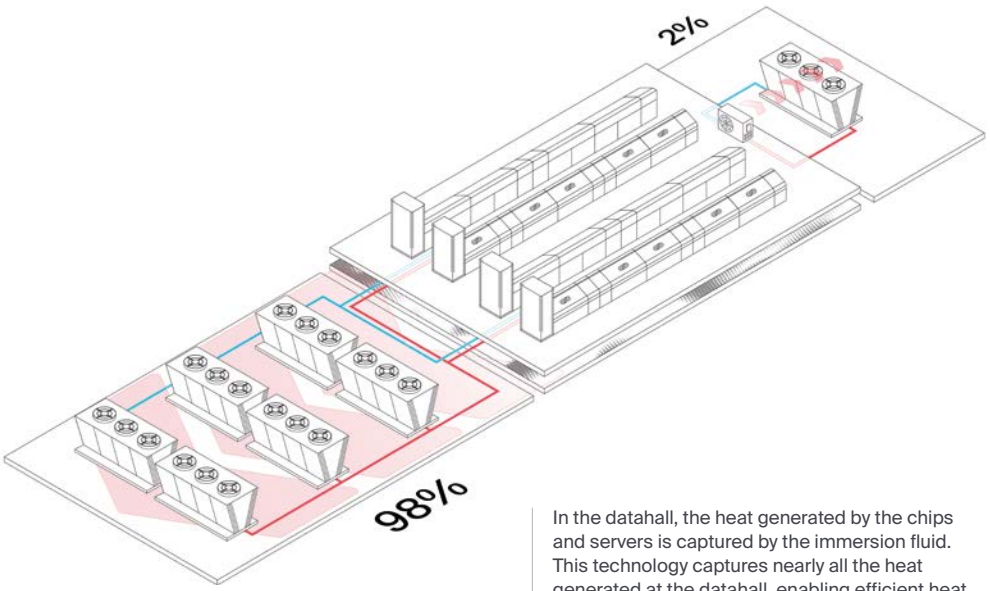
Aligning the commitment of Green Computing, eco-friendly and carbon neutral solutions while leading energy efficient designs Supermicro and Submer have developed a technological proposal that has direct impact on the operational costs of end users.

The use of the right liquid cooling technologies for each use case allows Supermicro and Submer to optimize space and energy use for general compute, edge and cloud deployments.

Why free cooling?

Aiming for free cooling deployments where no water or power consuming chillers are used will allow customers to decrease their operational costs dramatically, achieving PUEs below 1.1. This initiative allows higher IT density having the same power availability as the use of energy for cooling is highly reduced and it can be redirected to add more IT.

FIG. 1
Immersion cooling datacenter



In the datahall, the heat generated by the chips and servers is captured by the immersion fluid. This technology captures nearly all the heat generated at the datahall, enabling efficient heat harvesting and reuse for secondary purposes.

[02]

Technology set up

This proposal leverages high-efficiency Supermicro servers engineered for immersion, combined with Submer's advanced liquid cooling technology. This integration maximizes energy efficiency and extends the lifespan of IT equipment by protecting it from dust, moisture, and vibrations, while maintaining a stable thermal environment.

Working with building blocks of 192 AMD Turin 9825 CPUs, which include power distribution, network, cables and other accessories, we can scale to any size becoming a turnkey solution for DC design.

The following example is a cluster of 1920 CPUs liquid cooled with a FWS of 113F/45C allowing free cooling in environments with temperatures of up to 104F/40C, dramatically decreasing the operational costs of the DC.

Tech-mix

CPU

AMD Turin 9825

- 960 AMD CPUs
- 138.240 CPU Cores
- Up to 3,7 GHz
- 384MB L3 Cache
- 400W TDP



SERVER

AS-1126HS-TN1U

- Dual AMD EPYC 9004/9005
- x24 DIMM - up to 6TB Memory 6400MT/s
- x8 Front Hot-Swap 2,5" NVME/SATA Drive Bays
- x2 M2 PCIe 3.0
- x4 NVMe slots
- x1 PCIe 5.0 x16 FHHL slot
- x2 PCIe 5.0 x16 FHFL slots
- x1 PCIe 5.0 x16 AIOM slot (OCP 3.0 compatible)



TANK

SmartPod EXO TwinTank

- Optimized Immersion Tank for smooth & predictable daily IT Operations
- 99,999% SLA Availability (Full-Redundant | HA)
- FWS Inlet of 45°C and Fluid Setpoint up to 60°C for high-efficiency
- Improved Cable Management for structured layouts



Datacenter set up

FIG. 2
DC aerial view



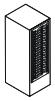
Power / Cabling



Pipes
Facility Water Supply (45°C inlet)



Tank



Air-Rack

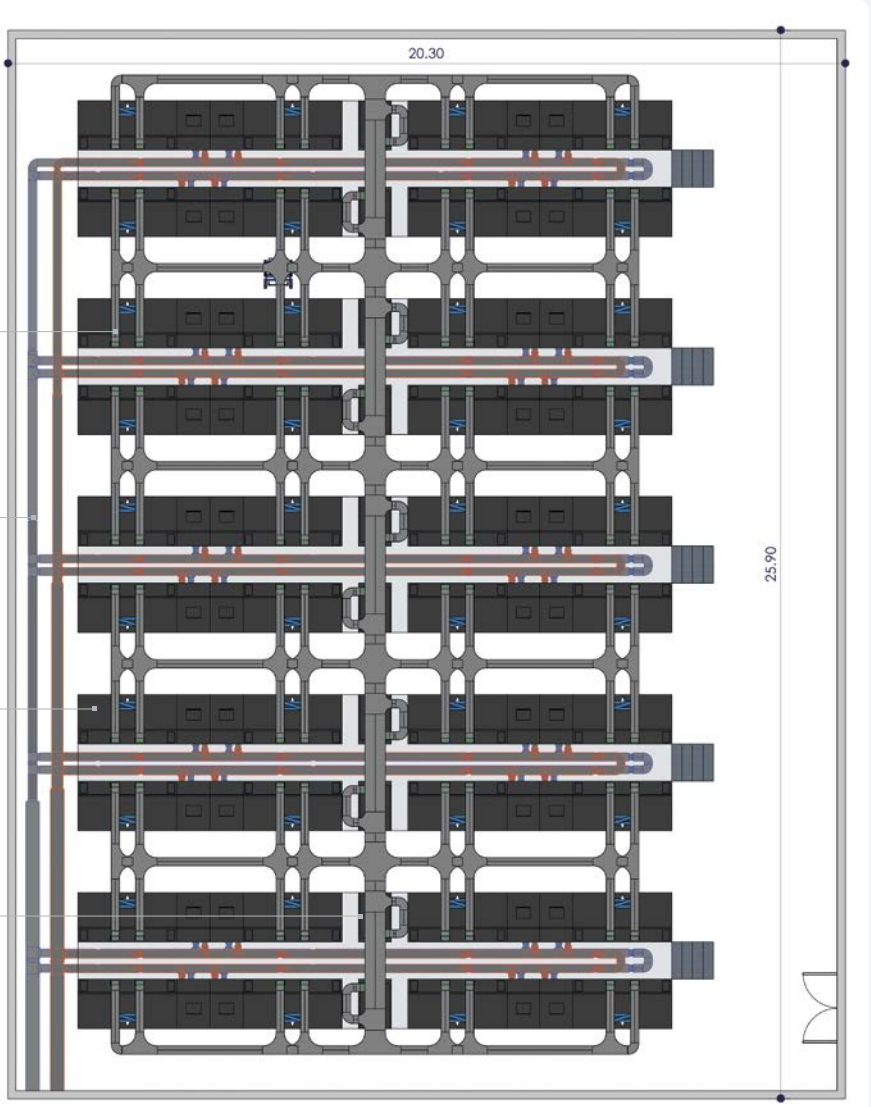
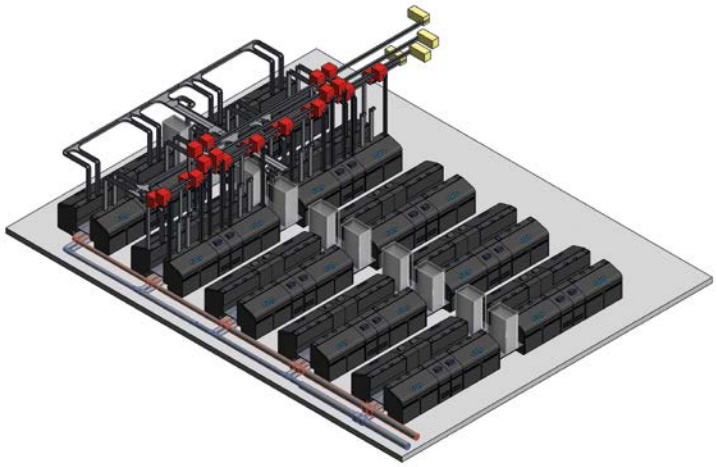


FIG. 3
Full clustered data hall

- Tap off from the main busbar to the secondary busbar
- Tap off from secondary busbar to the SmartPods



Datacenter set up

FIG. 4
Row cluster connectivity

- Tap off from the main busbar to the secondary busbar
- Tap off from secondary busbar to the SmartPods

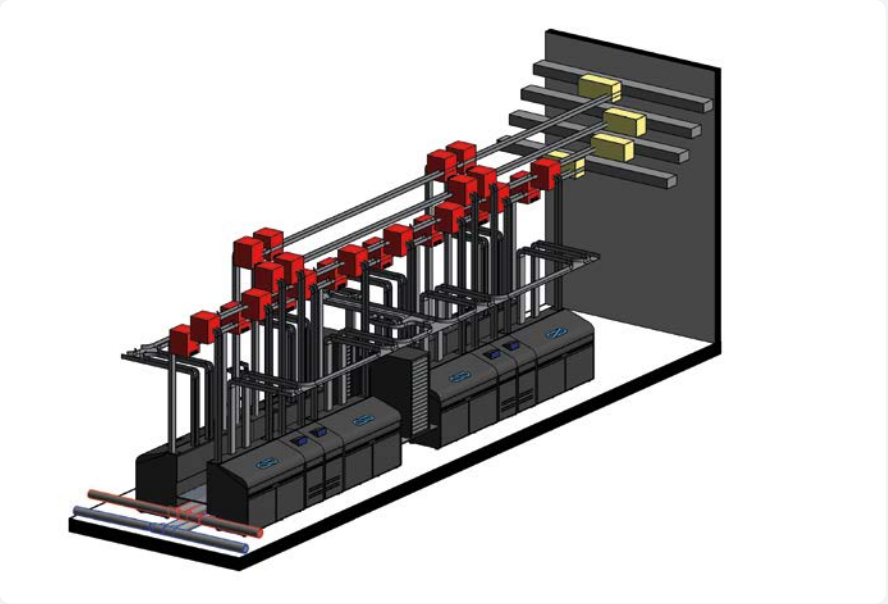


FIG. 5
Row cluster connectivity



FIG. 6
Row cluster connectivity



[04]

Datasheets / SKUs

COMPUTE SKUS
(Supermicro Model Server and Switches)

PART#	QTY	MANUFACTURER	DESCRIPTION
AS-1126HS-TN	48	Supermicro	Server Hyper-Turin 9655
SSE-T7132	1	Supermicro	100G Switch
SSE-G748	1	Supermicro	1G-10G-25G Ethernet Switch

COOLING SKUS
(Submer Tanks, Air Racks and Fluid Type)

PART#	QTY	MANUFACTURER	DESCRIPTION
SP_51S1UNIP_UL24	40	Submer	SmartPod EXO S100 Unitank UL
AR3350B2	1	APC	48RU Rack 1991H x 750W x 1200D
		NA	Hydrocarbon PAO2 Compatible Fluids

3RD POWER SKUS
(PDUs and Cables)

PART#	QTY	MANUFACTURER	DESCRIPTION
PC5001	48	Scolmore	C13 to C14 Red Cable 2m
PC5003	48	Scolmore	C13 to C14 Blue Cable 2m
APDU114505SM	4	Schneider Electric	PDU - APC NetShelter Rack PDU, 43.5kW 400V 63A or 34.6kW 415V 60A, 560P6, 42 Outlet
PC5001	48	Scolmore	C13 to C14 Cable 2m air rack
PC5003	48	Scolmore	C13 to C14 Cable 2m air rack
APDU114505SM	2	Schneider Electric	PDU - APC NetShelter Rack PDU, 43.5kW 400V 63A or 34.6kW 415V 60A, 560P6, 42 Outlet air rack

[04]

Datasheets / SKUs

NETWORK SKUS

(Network Copper Cables, Fiber Cables, Patch Pannels)

PART#	QTY	MANUFACTURER	DESCRIPTION
TQS-Q14HC-P8M01H9-8FZ	32	Formericaoe	100G-SR2 QSFP56 Active Pigtail, 1m
TQS-Q14HC-P8M02H9-8FZ	64	Formericaoe	100G-SR2 QSFP56 Active Pigtail, 2m
99SM69EVO-2U00-14V2	2	Wave2Wave.io	EVO 2U 14 cassette patch panel
69EVO50-0000-GY12	8	Wave2Wave.io	12-Port MPO feedthrough cassette
69EVO71-0000-4A	12	Wave2Wave.io	4-Port CAT6 feedthrough cassette
0948 474 7756 010	16	Harting	CAT6 1m
0948 474 7756 020	32	Harting	CAT6 2m
DPR-H1JJ1-V63020	12	Formericaoe	200G DAC - air rack
TQS-Q15H9-8FZ	48	Formericaoe	200G QSFP56 transceiver air rack
FCB-ACEE2-ARA0##	48	Formericaoe	MPO12 APC TO 2X MPO12 APC air rack
0948 474 7756 0##	48	Harting	CAT6 Yellow air rack

OPERATIONS

PART#	QTY	MANUFACTURER	DESCRIPTION
AC_SPLIFTBC-159B	1	Submer	Server lift



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